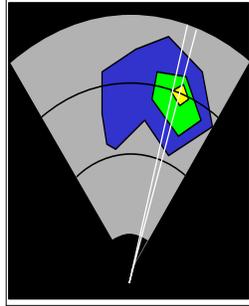

PANEL SESSIONS

Panel 4 -- Multifunctional Color Cockpit Displays



Moderator: Mr. William Phaneuf, *Senior Staff Engineer, Engineering and Air Safety Department, Air Line Pilots Association, Intl.*

Rapporteurs: Mr. Glenn Smith, *Aviation Throughput Goal Manager, Headquarters NASA*

Dr. Paul Try, *Office of the Federal Coordinator for Meteorology (Science and Technology Corporation)*

Synopsis

The main consensus from this session was:

- The need for a continuing, cooperative effort among stakeholders to address the full spectrum of issues related to development of an effective capability of providing weather information directly to aircraft in operation or “in the cockpit”. These issues include but are not limited to, considerations regarding product timeliness, relevance, accuracy and complexity, communications bandwidth, training, hardware certification, aircraft retrofit, workload factors, and differences in requirements between general and commercial aviation when weather information is uplinked to aircraft in flight.

In 1997 a national goal was established to reduce fatal aviation accidents by 80% within 10 years. NASA took the role of defining research areas to be conducted in partnership with FAA, DOD, industry, other government agencies, and academia. One of many research areas identified focused on a reduction of accidents where weather was either a precursor or a contributing cause. The NASA Aviation Weather Information (AWIN) project was implemented to develop enabling technologies that could provide information to pilots, dispatchers, and air traffic controllers that would be timely and intuitive, and enable both detection and avoidance of atmospheric hazards. A development of that research was the multifunctional color cockpit display.

Multifunctional color cockpit displays give us the capability to provide a wide assortment of both graphical and textual weather messages to the cockpit. Using information derived from a variety of approved government and commercial sources, as well as in situ and remote sensing capabilities, appropriately equipped flight crews may analyze both strategic and tactical information helpful for en route decisions.

General Aviation users may choose from basic small displays of minimum complexity to larger more complex displays integrated with primary navigation functions. Based upon an Airborne Flight Information Services (FIS) Policy Statement published by the FAA in 1998, Government-Industry Project Performance Agreements (G-IPPA's) were signed in July 1999 with two FIS Data Link service providers, ARNAV Systems, Inc. and Honeywell International, Inc. Through these agreements, commercial systems will be available soon.

Airline operations may be enhanced similarly with the availability of complex data link displays. These displays may either be fully integrated weather and navigation functions, independent multifunction panel mounted displays, or tethered and independently mounted display units. Guidance for the depth and breadth of information and its use in Part 121 operations will be both regulatory, and through information provided in air carrier operations specifications (OPS SPECS). NASA and United Airlines are currently demonstrating a weather information display system in limited line operations through the NASA funded AWIN research and development program.

A picture in the cockpit may be "worth one thousand words", as the saying goes. The type of picture and the information it conveys will be driven by the needs of the user. The responsibility for who provides the basic information, why the information is there, what the information says, and how the information is used will be a regulatory issue. As previously noted, the complexity of a display type, and where and how it fits in the cockpit will be a function of the user. Whether the choice is to portray a simple message of ceilings and visibility to enable en route go/no-go decisions for general aviation users or a complex graphical picture of en route air mass information for strategic routing decisions for commercial air carriers, the goal is an intuitive pictorial display.

The goal appears achievable. Demonstrations to date are encouraging. A continued cooperative effort is imperative to keep the goal in sight. At this stage of development, success does not seem impossible.

FAA Role in Cockpit Weather Data Link Applications

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ABSTRACT

FIS Data Link (FISDL) has become a reality this year based on an FAA Airborne FIS Policy Statement that was published in May 1998. Based on that Policy Statement, Government-Industry Project Performance Agreements (G-IPPs) were signed in July 1999 with two FISDL Service Providers, ARNAV Systems, Inc and Honeywell International, Inc. Through these agreements, pilots will have access to cockpit weather data link applications now rather than waiting for any FAA-only system which will not be available until late in the evolution of the NAS architecture upgrades.

FIS data link, especially weather graphics, has repeatedly been cited as a key strategy for improving flight safety. It is true that a "picture is worth a thousand words," but that worth depends on proper understanding, use and application of that data by pilots. Thus, the FAA role is to ensure that Standards exist for cockpit processing and display, that Guidelines and Authority for Operational Use provide for appropriate and safe applications, and that Training and Education materials adequately address both the quality and limitations of cockpit weather products.

The FAA is supporting the development of cockpit display standards through the RTCA Special Committee 195 and has established a comprehensive process for reviewing and accepting FIS products for FISDL broadcast by both ARNAV and Honeywell. The FAA has also published a revision to the Aeronautical Information Manual (AIM) and has drafted Advisory Circulars (ACs) that define and describe FIS data link services and their operational applications. Additionally, education and training material will be developed.

As FISDL services and products continue to expand, the FAA along with NASA will be conducting cockpit workload and human factors studies to establish sound technical basis for future guidance on standards, operational use, and education and training. The FAA will also be conducting data applications and operational assessments, especially on the need and viability of establishing a national electronic pilot reporting (E-PIREP) capability.

Multifunctional Color Cockpit Display; NASA Weather Accident Prevention Project

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ABSTRACT

In 1997 a national goal was announced to reduce the fatal accident rate for aviation by 80% within ten years. NASA immediately responded with a major program planning effort to define appropriate research areas to be conducted in partnership with the Federal Aviation Administration (FAA), Department of Defense (DOD), other government agencies, Industry, and academia. One such research area focused on developing enabling technologies that could reduce accidents where weather was the attributing cause of or one of the precursors to an accident.

The NASA Aviation Safety Program's Aviation Weather Information (AWIN) project will develop enabling technologies that will provide accurate, timely and intuitive information to pilots, dispatchers, and air traffic controllers to enable the detection and avoidance of atmospheric hazards. New and derivative weather products will be developed, complementing existing weather sources with in situ and remote sensing capability where necessary, to provide necessary information at appropriate temporal and spatial resolution for both tactical and strategic decision making for aviation users. Enhanced weather presentations will be developed to minimize interpretation and training required, enhance situation awareness and engagement, and reduce workload. It will also develop aids to improve decision-making, including collaborative processes, and will identify training needs and guidelines to support use of weather information technologies.

Cockpit Weather Uplink – User/Industry Perspective

*Carl Knable
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ABSTRACT

Crew weather support has undergone a dramatic change in the past 30 years. Legally, minimum weather briefing requirements for Part 121 flight crews can be met by a text only weather package. However, airlines have used existing graphics and communications technologies to supplement text weather briefings for many years. Initially, NWS fax charts posted at major hubs, were used to supplement text weather briefings. This was followed by vendor developed weather graphic products, transmitted to individual line stations using commercial fax recorders.

As PC's and the Internet technologies emerged, airlines turned to these technologies as a new means to deliver high quality, real time crew weather graphics. As part of its charter, NASA also began to research emerging information services technologies, resulting in the CWIN cockpit weather up-link project. In the late 90's additional funding for cockpit up-link research became available under the NASA ASIST/AWIN program. Two of the AWIN funded initiatives are the Ocean Convective Nowcast Demonstration (OCND) and the Weather Information Network (WINN). This presentation covers the status of OCND and WINN, and future plans regarding cockpit up-link from an airline perspective.